

**What is claimed is:**

1. An electrical smoking system comprising:

a cigarette comprising a tubular tobacco mat partially filled with tobacco material so as to define a filled tobacco rod portion and an unfilled tobacco rod portion, said filled tobacco rod portion being adjacent a free end of said cigarette; and

a lighter comprising an electrical heater element and a system for electrically actuating said heater element, said lighter arranged to at least partially receive said cigarette;

said cigarette and said lighter being mutually arranged so that when the cigarette is received in said lighter, said electrical heater element of the lighter at least partially superposes at least a portion of the filled tobacco rod portion;

said cigarette and said lighter being mutually arranged so that when the cigarette is received in said lighter, said free end of said cigarette is occluded;

said cigarette including a zone of perforations at a first location along said filled tobacco rod portion;

said cigarette being free of perforations along said unfilled tobacco rod portion.

2. A cigarette of an electrical smoking system, comprising a tobacco rod and a filter tipping attached to a tipped end portion of said tobacco rod, said tobacco rod comprising:

a tubular tobacco mat partially filled with tobacco material so as to define a filled tobacco rod portion and an unfilled tobacco rod portion, said filled tobacco rod portion being adjacent a free end of said cigarette;

said cigarette including a zone of perforations at a first location along said filled tobacco rod portion;

said cigarette being free of perforations along said unfilled tobacco rod portion.

3. The cigarette as claimed in claim 1, said tobacco rod further comprising a cigarette wrapper disposed about said tubular tobacco mat, said perforations extending at least partially through said wrapper and said mat.

4. The cigarette as claimed in claim 3, wherein said cigarette is adapted to receive thermal treatment along a length portion of said tobacco rod corresponding to a heater footprint of an electrical lighter, said length portion spaced a predetermined distance from said free end portion of said tobacco rod, said first location of said zone of perforations being spaced from said free end of said tobacco rod a first distance approximately equal to said predetermined distance.

5. The cigarette as claimed in claim 3, wherein said cigarette is adapted to receive thermal treatment along a length portion of said tobacco rod corresponding to a heater footprint of an electrical lighter, said length portion spaced a predetermined distance from said free end portion of said tobacco rod, said first location of said zone of perforations being spaced from said free end of said tobacco rod a first distance greater than said predetermined distance.

6. The cigarette as claimed in claim 3, wherein said cigarette is adapted to receive thermal treatment along a length portion of said tobacco rod corresponding to a heater footprint of an electrical lighter, said length portion spaced a predetermined distance from said free end portion of said tobacco rod, said first location of said zone of perforations being spaced from said free end of said tobacco rod a first distance less than said predetermined distance.

7. The cigarette as claimed in claim 3, further comprising a plurality of circumferentially spaced-apart holes in said tubular tobacco mat at a second location along said filled tobacco rod portion, said wrapper covering said mat holes.

8. The cigarette as claimed in claim 7, wherein said tubular tobacco mat comprises a tubular base web and a layer of tobacco material disposed along an interior of said tubular base web;

said mat holes extending through said base web and said layer of tobacco material.

9. The cigarette as claimed in claim 7, wherein said mat holes are approximately 1 mm in diameter and 6 in number, arranged in a row and said zone of perforations comprises one or two rows of perf-holes, each row having 12 perf-holes.

10. The cigarette as claimed in claim 7, wherein said second location of mat holes is spaced from said free end of said tobacco rod a second distance of approximately 7 mm and said zone of perforations comprises at least one row of 12 perf-holes spaced approximately 12 mm from said free end.

11. The cigarette as claimed in claim 2, said tobacco rod further comprising a cigarette wrapper disposed about said tubular tobacco mat, said perforations extending at least partially through said wrapper and said mat.

12. The cigarette as claimed in claim 11, wherein said cigarette is adapted to receive thermal treatment along a length portion of said tobacco rod corresponding to a heater footprint of an electrical lighter, said length portion spaced a predetermined distance from said free end portion of said tobacco rod, said first location of said zone of perforations being spaced from said free end of said tobacco rod a first distance approximately equal to said predetermined distance.

13. The cigarette as claimed in claim 11, wherein said cigarette is adapted to receive thermal treatment along a length portion of said tobacco rod corresponding to a heater footprint of an electrical lighter, said length portion spaced a predetermined distance from said free end portion of said tobacco rod, said first location of said zone of perforations being spaced from said free end of said tobacco rod a first distance greater than said predetermined distance.

14. The cigarette as claimed in claim 11, wherein said cigarette is adapted to receive thermal treatment along a length portion of said tobacco rod corresponding to a heater footprint of an electrical lighter, said length portion spaced a predetermined distance from said free end portion of said tobacco rod, said first location of said zone

of perforations being spaced from said free end of said tobacco rod a first distance less than said predetermined distance.

15. The cigarette as claimed in claim 7, wherein a second perforation zone is established at a third location along said tobacco rod;

said second location of mat holes being between said first and third locations, said second location of mat holes is optionally spaced from said free end of said tobacco rod a first distance of approximately 7 mm and said perforation zones are optionally spaced from said free end of said tobacco rod approximately 4 and 12 mm, respectively.

16. The cigarette as claimed in claim 11, wherein a second perforation zone is established at a third location along said tobacco rod;

said second location of mat holes being between said first and third locations, said second location of mat holes is optionally spaced from said free end of said tobacco rod a first distance of approximately 7 mm and said perforation zones are optionally spaced from said free end of said tobacco rod approximately 4 and 12 mm, respectively.

17. The cigarette as claimed in claim 2, wherein said tobacco rod includes a tubular body at the tipped end portion of the tobacco rod; and

said filter tipping includes a free flow filter adjacent said tubular body and a mouthpiece filter adjacent said free flow filter.

18. The cigarette as claimed in claim 17, wherein said tubular body has a smaller inside diameter than said free flow filter.

19. The lighter as claimed in claim 1, further comprising an air admission passage and an arrangement operative at a location along said air admission passage to produce a pressure drop in the range of 10 to 40 mm water.

20. The lighter as claimed in claim 19, further comprising a puff sensor having a sensitivity to a change in pressure in the range of 10 to 40 mm water.

21. The system as claimed in claim 1, said lighter further comprising an air admission passage and an arrangement operative at a location along said air admission passage to produce a pressure drop in the range of 20 to 30 mm water.

22. The system as claimed in claim 21, said lighter further comprising a puff sensor having a sensitivity to a change in pressure in the range of 20 to 30 mm water.

23. The system as claimed in claim 22, wherein said cigarette has a resistance to draw of approximately 20 to 25 mm water.

24. The system as claimed in claim 1, wherein said lighter further comprises a flow deflector arranged to direct air drawn into said lighter toward a cigarette receiving location within said lighter, the air flow deflector directing the air in a circumferential zone around the cigarette at the location of the zone of perforations.

25. The system as claimed in claim 24, wherein at least a portion of said lighter adjacent said cigarette receiving location is constructed of a metal, including at least said air flow deflector.

26. The system as claimed in claim 21, wherein said lighter further comprises an air flow deflector arranged to direct air drawn into said lighter toward a cigarette receiving location within said lighter, the air flow deflector directing the air in a circumferential zone around the cigarette at the location of the zone of perforations.

27. The system as claimed in claim 26, wherein at least a portion of said lighter adjacent said cigarette receiving location is constructed of a metal, including at least said air flow deflector.

28. A method of making a cigarette, comprising the steps of:  
repetitively arranging a tobacco plug and a filter element along a ribbon of tobacco mat;  
punching a row of holes at spaced locations along said ribbon of mat material with opposing rollers; and  
wrapping said mat and a wrapper around the repetitively arranged tobacco plug and the filter element, the tobacco plug, the filter element, and an inner surface of the wrapper defining a cavity between the tobacco plug and the filter element, such that the row of mat holes is disposed in superposing relation only with the tobacco plug.

29. An apparatus for perforating a tobacco rod prior to assembly of the tobacco rod to a filter rod via tipping paper, comprising:  
a drum link-up assembly adapted to transfer a tobacco rod from a combining apparatus to a tipping apparatus wherein the tobacco rod is attached to a filter rod by tipping paper; and  
a laser perforating apparatus adapted to burn one or more holes in an outer surface of the tobacco rod while the tobacco rod is in the drum link-up assembly.

30. The apparatus of Claim 29, wherein the laser perforating apparatus includes a lens arrangement which burns at least one circumferentially extending row of perforations into the tobacco rod.

31. The apparatus of Claim 30, wherein the drum link-up assembly includes a drum having flutes on an outer surface thereof, the laser perforating apparatus being adapted to rotate the tobacco rod about its axis while pulsing a laser to burn the at least one row of perforations into the tobacco rod as the tobacco rod is rolled from one flute to an adjacent flute.

32. The apparatus of Claim 29, wherein the laser perforating apparatus includes a beam splitter which separates a beam from a pulsed laser into at least two beams which burn at least two rows of elongated holes into the tobacco rod.

33. The apparatus of Claim 29, wherein the drum link-up assembly comprises at least one rotating drum having flutes sized to carry 2-up tobacco rods.

34. The apparatus of Claim 29, wherein the drum link-up assembly includes a series of drums which transfer 2-up tobacco rods to the tipping machine, the drums including a catch drum, a transfer drum, a swash plate drum, a laser drum, a cutting drum, and a separating drum, the catch drum receiving 2-up tobacco rods from a delivery device of a combining apparatus and delivering the 2-up tobacco rods to the transfer drum, the transfer drum delivering the 2-up tobacco rods to the swash plate drum, the swash plate drum aligning the 2-up tobacco rods and delivering the aligned 2-up tobacco rods to the laser drum, the laser drum orienting the 2-up tobacco rods such that the laser perforating apparatus burns at least two longitudinally spaced apart rows of perforations on each of the 2-up tobacco rods, the laser drum delivering the 2-up tobacco rods to the cutting drum, the cutting drum cutting the 2-up tobacco rods into a pair of tobacco rods of unit length and delivering the pair of tobacco rods to the separating drum, the separating drum separating the pair of tobacco rods longitudinally apart and delivering the separated tobacco rods to an assembly of a tipping apparatus at which the pair of tobacco rods are combined with a 2-up filter rod by placing the 2-up filter rod between the pair of spaced apart tobacco rods.

35. The apparatus of Claim 29, wherein the apparatus further comprises the combining machine, the combining machine including means for wrapping a tobacco plug and a free-flow filter plug within a tobacco matt and an outer paper wrapper to form a continuous tobacco rod, the combining machine including a cutting apparatus which cuts the continuous tobacco rod into 2-up tobacco rod segments, the laser perforating apparatus being adapted to burn perforating holes at locations on the 2-up tobacco rods such that the perforating holes pass through the outer paper wrapper and the tobacco matt and into the tobacco plugs of the 2-up tobacco rod segments.

36. The apparatus of Claim 29, wherein the apparatus further includes the tipping apparatus, the tipping apparatus including means for attaching the perforated tobacco rods to filter rods by locating a 2-up filter rod in a space between a pair of the

perforated tobacco rods, wrapping tipping paper around the 2-up filter rod such that the tipping paper overlaps portions of the perforated tobacco rods, gluing ends of the tipping paper together, and cutting the 2-up filter rods to produce a pair of cigarettes.

37 The apparatus of Claim 36, wherein the tipping apparatus includes a laser perforating station at which the cigarettes are provided with additional perforation holes, the laser perforating station including a lens arrangement which burns at least one circumferentially extending row of the additional perforations into the tobacco rod.

38. A method of perforating a tobacco rod prior to assembly of the tobacco rod to a filter rod via tipping paper, comprising:

supplying a tobacco rod to a drum link-up assembly wherein the tobacco rod is moved from a combining apparatus to a tipping apparatus wherein the tobacco rod is attached to a filter rod by tipping paper; and

forming a perforated tobacco rod by actuating a laser perforating apparatus so as to burn one or more perforating holes in an outer surface of the tobacco rod while the tobacco rod is in the drum link-up assembly.

39. The method of Claim 38, wherein the laser perforating apparatus includes a lens arrangement which burns at least one circumferentially extending row of the perforation holes into the tobacco rod.

40. The method of Claim 39, wherein the drum link-up assembly includes a drum having flutes on an outer surface thereof, the laser perforating apparatus rotating the tobacco rod about its axis while pulsing a laser to burn the at least one row of the perforation holes into the tobacco rod.

41. The method of Claim 38, wherein the laser perforating apparatus includes a beam splitter which separates a beam from a pulsed laser into at least two beams which burn at least two rows of elongated holes into the tobacco rod.



42. The method of Claim 38, wherein the drum link-up assembly includes at least one rotating drum having flutes which deliver 2-up tobacco rods to the laser perforating apparatus.

43. The method of Claim 38, wherein the drum link-up assembly includes a series of drums which transfer 2-up tobacco rods to the tipping machine, the drums including a catch drum, a transfer drum, a swash plate drum, a laser drum, a cutting drum, and a separating drum, the catch drum receiving 2-up tobacco rods from the combining apparatus and delivering the 2-up tobacco rods to the transfer drum, the transfer drum delivering the 2-up tobacco rods to the swash plate drum, the swash plate drum aligning the 2-up tobacco rods and delivering the aligned 2-up tobacco rods to the laser drum at which the perforation holes are burned into at least two longitudinally spaced apart locations on each of the 2-up tobacco rods, the laser drum delivering the 2-up tobacco rods to the cutting drum at which the 2-up tobacco rods are cut in half, the cutting drum delivering tobacco rods to the separating drum at which the cut tobacco rods are separated apart, and the separating drum delivering the tobacco rods to an assembly drum of a tipping apparatus at which a 2-up filter rod is placed between the separated tobacco rods.

44. The method of Claim 38, further comprising producing the tobacco rods in the combining machine by wrapping alternating 2-up tobacco plugs and 2-up free-flow filter plugs within a tobacco matt and an outer paper wrapper to form a continuous tobacco rod, cutting the continuous tobacco rod into 2-up tobacco rods, and delivering the 2-up tobacco rods to the drum link-up assembly, the laser perforating apparatus being set to a power level sufficient to burn the perforation holes at locations along the 2-up tobacco rods such that the perforation holes pass through the outer paper wrapper and the tobacco matt into the tobacco plugs.

45. The method of Claim 38, further comprising producing cigarettes by delivering the perforated tobacco rods to the tipping apparatus and attaching the perforated tobacco rods to filter rods by locating a 2-up filter rod in a space between a pair of the perforated tobacco rods, wrapping tipping paper around the 2-up filter rod

such that the tipping paper overlaps portions of the perforated tobacco rods, gluing ends of the tipping paper together, and cutting the 2-up filter rods to produce a pair of cigarettes.

46. The method of Claim 44, further comprising producing cigarettes by delivering the perforated tobacco rods to the tipping apparatus and attaching the perforated tobacco rods to filter rods by locating a 2-up filter rod in a space between a pair of the perforated tobacco rods, wrapping tipping paper around the 2-up filter rod such that the tipping paper overlaps portions of the perforated tobacco rods, gluing ends of the tipping paper together, and cutting the 2-up filter rods to produce a pair of cigarettes.

47. The method of Claim 46, further comprising a step of perforating the cigarettes in the tipping apparatus by delivering the cigarettes to a laser perforating station at which the cigarettes are provided with additional perforation holes, the laser perforating station including a lens arrangement which burns at least one circumferentially extending row of perforations into the tobacco rod at a location such that the perforation holes pass into the tobacco plug.

48. An apparatus for manufacturing a cigarette, said apparatus comprising a combining apparatus wherein a continuous tobacco rod is formed by placing 2-up tobacco plugs and 2-up hollow plugs in spaced, alternating relation from one another and wrapping a tobacco web and an overwrap about said spaced apart plugs after which the continuous tobacco rod is cut into 2-up tobacco rods; a tipping apparatus wherein the 2-up tobacco rods are attached to filter rods by tipping paper; and a transfer apparatus which directly links the combining apparatus to the tipping apparatus, and allows for the transfer of the 2-up tobacco rods from the combining apparatus to the tipping apparatus.

49. The apparatus of claim 48, wherein the transfer apparatus includes a swash drum which aligns the 2-up tobacco rods, a cutting drum which cuts the

aligned 2-up tobacco rods in half, a separating drum which separates the cut tobacco rods, and/or a catch drum which is directly linked to the combining apparatus.

50. The apparatus of claim 48, wherein the transfer apparatus includes a laser system which burns perforations into the 2-up tobacco rods, the laser system optionally burning at least one circumferential band of perforations at two longitudinally spread-apart locations on the 2-up tobacco rod.

51. The apparatus of claim 48, wherein the combining apparatus cuts the continuous tobacco rod into 2-up tobacco rod portions comprising a 1-up tobacco plug on each end and one of said 2-up hollow plugs therebetween.

52. The apparatus of claim 48, wherein the transfer apparatus includes a series of drums which transfer 2-up tobacco rods to the tipping machine, the drums including a catch drum, a transfer drum, a swash plate drum, a laser drum, a separator drum and a cutting drum, the catch drum delivering the 2-up tobacco rods to the transfer drum, the transfer drum delivering the 2-up tobacco rods to the swash plate drum, the swash plate drum delivering the 2-up tobacco rods to the laser drum at which laser perforations are burned into the 2-up tobacco rods, the laser drum delivering the 2-up tobacco rods to the cutting drum at which the 2-up tobacco rods are cut in half, the cutting drum delivering the tobacco rods to the separating drum at which the tobacco rods are separated, the separating drum delivering the 2-up tobacco rods to the tipping machine.

53. The apparatus according to claim 51, wherein an assembly drum in the tipping machine receives the spaced apart tobacco rods which are combined with 2-up filter rods by placing a 2-up filter rod between a pair of spaced apart tobacco rods and the tipping apparatus includes means for wrapping tipping paper around the 2-up filter rod such that the tipping paper overlaps portions of the tobacco rods, gluing ends of the tipping paper together, and cutting the 2-up filter rods to produce a pair of cigarettes.

54. The apparatus of claim 48, wherein the tipping apparatus includes a laser perforating station at which the cigarettes are perforated.

55. A method of manufacturing a tobacco rod portion of a cigarette, said method comprising forming a continuous tobacco rod in a combining apparatus by placing 2-up tobacco plugs and 2-up hollow plugs in spaced alternating relation from one another and wrapping a tobacco web and overwrap about said spaced apart plugs; and severing said continuous tobacco rod into 2-up tobacco rods at an outlet portion of the combining apparatus, the 2-up tobacco rods comprising two 1-up tobacco plugs on opposite ends thereof and one of said 2-up hollow plugs located between said two 1-up tobacco plugs.

56. The method of claim 55, further comprising using a transfer apparatus to transfer the 2-up tobacco rods from the combining apparatus to a tipping apparatus, using the transfer apparatus to cut the 2-up tobacco rods to tobacco rods of unit length, using the transfer apparatus to align the 2-up tobacco rods prior to cutting them to unit length, and/or using the transfer apparatus for spacing apart the cut tobacco rods of unit length.

57. The method of claim 56, wherein the transfer apparatus includes a series of drums which transfer the 2-up tobacco rods to the tipping apparatus, the drums including a catch drum, a transfer drum, a swash plate drum, a laser drum, a cutting drum and a separator drum, the catch drum delivering the 2-up tobacco rods to the transfer drum, the transfer drum delivering the 2-up tobacco rods to the swash plate drum, the swash plate drum delivering the 2-up tobacco rods to the laser drum at which a plurality of laser perforations are burned into the 2-up tobacco rods, the laser drum delivering the 2-up tobacco rods to the cutting drum at which the 2-up tobacco rods are cut in half, the cutting drum delivering the tobacco rods to the separating drum at which the tobacco rods are separated, the separating drum delivering the tobacco rods to the tipping apparatus.

58. The method of claim 55, wherein the transfer apparatus a series of drums which transfer 2-up tobacco rods to the tipping apparatus, the drums including a catch drum, a transfer drum, a cutting drum and a separator drum, the catch drum delivering the 2-up tobacco rods to the transfer drum, the transfer drum delivering the 2-up tobacco rods to the cutting drum at which the 2-up tobacco rods are cut in half, the cutting drum delivering the tobacco rods to the separating drum at which the tobacco rods are separated, the separating drum delivering the tobacco rods to the tipping apparatus.

59. The method of claim 55, wherein the tobacco rods are transferred from the combining apparatus to the tipping apparatus by a series of interengaging drums which minimize damage to the tobacco rods during such transfer.